Driving under the Influence of Marijuana

Application submitted to the Marijuana Policy Project's 2003 Grants Program

Submitted by
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2. Project Background and Objectives

Background and Motivation:

Unlike for alcohol, jurisdictions in the U.S. and virtually all other Western countries have based their policy on driving under the influence of marijuana (DUIM) not on scientific evidence on the actual impairment caused by marijuana. Rather, these policies are generally based on the assumption that the detection of any amount of delta-9-tetrahydrocannabinol (THC), the pharmacologically most active ingredient of marijuana, or even its inactive metabolite THC-COOH, in the blood or urine of a driver are proof of impairment. Furthermore, many jurisdictions categorically assume that the consumption of marijuana, even if not related to the operation of a vehicle, indicate that a person is not suited to operate a vehicle and will often revoke the right to drive. Even though consumption of marijuana remains illegal in virtually all jurisdictions in Western countries, possession and small-scale use of marijuana has been decriminalized in some countries (The Netherlands, Germany), and many jurisdictions in the U.S. do not prosecute under these circumstances. This situation calls for a reevaluation of the DUIM issue and the establishment of a science-based, rational foundation for government policies and law enforcement practices on marijuana and driving in analogy to the system developed for alcohol.

Several studies have in fact demonstrated that consumption of marijuana impairs abilities that are important for driving, including psychomotor performance, estimation of time and distances, sustained attention and perception. This raises the question whether and to which extend marijuana use increases the risk for road accidents, how that risk may compare with that caused by alcohol, how impairment can be tested and quantified by law enforcement and how the risk caused by marijuana consumption can be minimized.

Researchers have employed several approaches to address these issues, yet their interpretation has raised additional questions. In driving simulator studies the impairment caused by commonly consumed THC doses corresponded to the impairment caused by a blood alcohol concentration (BAC) of 0.03-0.09%. However, in contrast to alcohol, subjects under the influence of marijuana tended to be aware of their impairment and generally tried to compensate, while subjects under alcohol tended to drive in a more risky manner. Thus, impairment by THC and the corresponding levels of THC and its metabolites in blood or urine cannot be readily compared to that caused by alcohol. Various studies also found that,

depending on study and country, typically 4-12% of drivers injured or killed in road accidents had detectable amounts of THC in their blood. However, methodological problems with these studies and the fact that many of these drivers also screened positive for alcohol preclude accurate determination of the accident risk caused by THC.

The most reliable method to assess the risks posed by marijuana on traffic safety is called “culpability analysis”. Culpability studies investigate accidents *post hoc* based upon information (usually from police data) about the causative factors of the accident. Although methods may vary in detail, generally scores are used to classify each driver as "culpable", or "not culpable". Those drivers who had no detectable drugs in blood constitute the control group. Culpability conducted so far show that drivers with THC in their blood are not significantly different from drug-free drivers with a culpability rate of about 50%, while drivers with blood alcohol concentrations above 0.05% are responsible in about 90%. Drivers with high THC concentrations in their blood tend to have a higher risk compared to drug free drivers.

However, it is difficult to assess the individual risk a marijuana using driver poses in a specific situation. Compared to alcohol, where BAC serves as a reliable indicator of impairment, the pharmacokinetics of THC often do not allow separation of impaired from non-impaired persons by means of blood laboratory tests or screenings of body fluids. This is due to the lipophilic nature of THC which, compared to the water-soluble alcohol, shows a much more complicated pharmacokinetic behavior. Simple detection of low levels of THC or its metabolites in body fluids proves consumption but not impairment.

Finally, there does not appear to be a justification for classifying users of marijuana as generally unqualified to drive a vehicle. The decline of cognitive and psychomotor performance caused by heavy and long-term marijuana use has been reported to be only modest, and so far, there is no epidemiological evidence that regular users of marijuana have a higher accident risk than non-users.

The above suggests the need for a comprehensive scientific review of available evidence on the acute and long-term impacts of marijuana use on driving performance and general qualification to operate a vehicle. The findings from such a review would then form the basis for recommendations to legislators, attorneys, judges and law enforcement officers for the development and implementation of rational policies for testing and judging the potential impairment of drivers by marijuana. Initial research on the subject, coordinated by Franjo Grotenhermen and Michael Karus, was published in book-form in Germany in 2002. The book included contributions by several acknowledged international researchers on transportation and drug-use issues. In our opinion, the preparation of a condensed, up-to-date document on DUIM issues, including recommendations for stakeholders would provide the discussion in the U.S. with the urgently needed science-based information on the subject.

Objectives

The proposed project has the following major objectives:

- To establish a current, critically reviewed body of scientific knowledge on the issue of DUIM;
- To develop a consensus with key international researchers on the short-term and chronic risk caused by DUIM, quantitative thresholds by which to judge the impairment of drivers, and practical methods by which law enforcement officers can test for impairment;
- To present the results of this research in format useful to key target audiences;
- To support dissemination of project results to these audiences.

3. Project plan

Scope of Work

To achieve the above objectives, the following activities will be undertaken:

Research Activities

- Database research to establish a current list of scientific publications on the issue of DUIM;
- Acquisition and critical review of all relevant publications;
- Preparation of a bibliography of the most important publications (about 50), including citation and short abstract. Example: Lowenstein SR, Koziol-McLain J. Drugs and traffic crash responsibility: a study of injured motorists in Colorado. J Trauma 2001;50(2):313-320. *Study with 414 drivers injured in traffic accidents. In 17% cannabinoid metabolites and in 14% alcohol were found in urine. The culpability risk for alcohol positive drivers was 3.2, for cannabinoid positive drivers 1.1. In a mulivariate analysis including age, sex, drugs and other factors only alcohol predicted accident culpability.*
- Development of conclusions on the impairment of drivers by marijuana and recommendations for science-based rational policies and testing of impairment. Focus will be the identification of suitable methods for determination of impairment of a driver by marijuana and the establishment of cannabinoid levels in blood below which relevant impairment can be safely excluded.
  Given the above-mentioned pharmacological and methodological issues with DUIM, it is crucial that conclusions and recommendations are based on the input from and critical review by a range of researchers in the field. Such input would be obtained from a group of 5-10 selected experts in the fields of pharmacology, drug testing and traffic safety. Participating experts will include Alison Smiley (Canada), Günter Berghaus (Germany), and Marie Longo (Australia) who also contributed to the previous work by Grotenhermen and Karus on the subject. It will be attempted to develop a consensus position between participating scientists. If no consensus on THC limit and test methods can be reached, a range of approaches will be presented. They would likely represent differences among the researchers in the degree of conservatism and the required margin of safety applied when deriving quantitative limits from the available scientific evidence.

Deliverables

- Conclusions and recommendations (C&R) will be presented in a 15-20 page report for use by legislators, attorneys, journalists and drug policy reformers, with an executive summary of 1-2 pages highlighting key points. The document will focus on a review of well-documented facts on DUIM, a comparison with the impact of alcohol, and recommendations for determining the degree of impairment of drivers under the influence of marijuana.
- The text shall be followed by an extended appendix to the text to underline its scientific analyses and arguments. The appendix shall include a reference list of about 200 publications and a more detailed presentation of several issues of interest (e.g. results of

simulator studies, results of culpability studies, long-term effects of marijuana use, pharmacokinetic specialities of THC).

Dissemination

- Over a six-month period following release of the study, the authors would support dissemination of its findings and recommendations through preparation of short expertise documents, interviews with journalists and responses to inquiries by legislators and attorneys.

Project Schedule

Dec. 1, 2003:	Project start
Dec. 1, 2003 – Feb. 1, 2004:	Literature review, preparation and circulation of draft conclusions and recommendations to participating scientists,
Feb 1-May 1, 2004:	Review of draft C&R by participating experts, development of joint position, preparation of project report
May 1, 2004-Dec.1, 2004:	Support dissemination to target audiences.

Project Team

Drs. Grotenhermen and Leson will act as project scientists. Dr. Grotenhermen will serve as the project's primary investigator. He will oversee literature research, development of draft C&R and coordinate collaboration with participating scientists. He will also support the dissemination of project C&R through statements, testimonies and interviews.

Dr. Leson will support Dr. Grotenhermen through critical review and editing of project documents and facilitation of dissemination activities in the U.S.

The two project scientists will be supported by research and administrative staff in identifying and acquiring current publications and the preparation of project outputs.

A list of 5-10 selected participating experts to be finalized upon receipt of a formal funding commitment from MPP.

Project Budget

Task / Budget Item	Category	Hours	Rate ($/h)	Amount
Literature review/preparation of draft C&R	Project Scientists	100	$50	$ 5,000
Development of joint position, preparation of project output	Project Scientists	100	$50	$ 5,000
Research and document production	Research/ Administrative staff	80	$30	$ 2,400
Honorarium (assumes 8 experts @$500 per person)	Participating experts			$ 4,000
Dissemination	Project scientists	60	$ 50	$ 3,000
Expenses (telecommunication, office expenses, printing, postage)				$ 2,000
Project Total				**$ 21,400**

Project Financing

Total Project Budget	$ 21,400
Co-financing by Dr. Bronner's Magic Soaps, Escondido, CA	$5,000
Funding requested from MPP Grants Program	**$16,400**

4. Measurement and Reporting of Project Success

The proposed project will be considered "successful" by the applicants, if it produces the following measurable outputs:

- Development, circulation and submittal to MPP, of draft conclusions and recommendations by February 1, 2004;
- Production, distribution and submittal to MPP of a consensus-based project report, as defined above, by May 1, 2004;
- A list and assessment of dissemination activities, possibly reviews and other forms of feedback on the document, to be submitted to MPP by December 31, 2004.

5. Description of applicant's mission, history, accomplishments, and current activities.

Dr. Franjo Grotenhermen has devoted the last 10 years of his career to the investigation of scientific and policy issues related to the medicinal and recreational use of marijuana, as well as the use of hemp-seed based food items. Dr. Grotenhermen is founder and chairman of the International Association for Cannabis as Medicine (IACM) based in Cologne, Germany, and a principal of the nova-Institute, Hürth, Germany. IACM serves as a global clearinghouse for science-based information on the medicinal uses of cannabis and continues to provide information to other researchers, patients, pharmaceutical firms, policy makers, and the media. Dr. Grotenhermen has also been a key team member to several efforts on marijuana policy in and outside of Germany, including the preparation, with Jon Gettman and others, of a recent rescheduling petition for marijuana with the U.S. Drug Enforcement Administration (DEA) and research efforts addressing the potential impacts of THC residues in hemp foods.

Grotenhermen was involved in an extended expert opinion on cannabis and driving, which was used successfully in a lawsuit in the German state of Bavaria. Based on his findings, he and Michael Karus edited a 450-page German book on cannabis use, driving and workplace ("Cannabiskonsum, Straßenverkehr und Arbeitswelt") published by Springer. This book has gained much recognition in Germany and is used by lawyers in lawsuits related to the revocation of drivers licenses. Some scientists from English speaking countries, Wayne Hall and Marie Longo (Australia), and Alison Smiley (Canada) contributed chapters, but most authors were Germans. The book received a very favorable review in "Blutalkohol" ("Blood Alcohol"), the journal of the German Society of Traffic Medicine and the Union against Alcohol and Drugs in Traffic, the most relevant scientific journal on traffic safety published in German. The book also initiated an intense discussion in the journal.

Dr. Gero Leson, originally trained as physicist and environmental scientist, works as environmental researcher and consultant in the U.S., Europe and Asia. Through his work on the technical and economic viability of hemp and other natural fibers he became involved in the scientific assessment of the benefits of hempseed-based foods. He initiated, coordinated and published the results of the first comprehensive toxicological study on the potential interference of THC residues in hemp foods with workplace drug testing. The study, the results of which have since been confirmed by other researchers, suggested that the low THC levels now commonly achieved in hemp seeds and oil are not sufficient to produce confirmed positive urine tests for marijuana. Dr. Leson also coordinated and co-authored with Drs. Grotenhermen and Pless the preparation of a risk assessment on the potential health risks caused by THC residues in hemp foods. The document was submitted to Health Canada for consideration in the agency's current re-assessment of the potential risks posed by hemp foods. Dr. Leson's expert testimony on issues related to THC residues provided key support to legal action by hemp food manufacturers against the DEA, which had in 2001 issued rules, in effect banning the distribution of hemp foods containing "any amount of THC". As a result of this joint legal action, the DEA's "Interpretive Rule" has since been overturned by a federal court, which also recently granted the industry's request to stay the DEA's final rule.

6. Non-profit applicants

Not applicable.

7. Applicant's financial statements

The financial statements of Dr. Grotenhermen are available in German only and may be sent to MPP if desired.

8. Applicants seeking 501(c)(3) funds

Not applicable.

9. Relevant publications and/or video clips.

Selected Internet References

International Association for Cannabis as Medicine: http://www.cannabismed.org

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Rescheduling Petition for Marijuana: http://www.drugscience.org

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References on other Marijuana and THC related issues (English publications only):

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